Stoller
Grand Junction Office established 1959

299-E28-8 (A6788)
Log Data Report

Borehole Information:

Borehole: 299-E28-8 (A6788)			**Site:** East of 216-E-9 Burial Ground		
Coordinates (WA State Plane)		**GWL (ft)[1]:** 270.45		**GWL Date:** 12/12/2002	
North	**East**	**Drill Date**	**TOC[2] Elevation**	**Total Depth (ft)**	**Type**
137,074.3 m	573,698.1 m	Sept. 1957	668.28 ft	314	Cable Tool

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Welded Steel	1.9	8 5/8	8	5/16	0	298

The logging engineer measured the casing stick-up using a steel tape. A caliper was employed to determine the outside casing diameter, and measurements were rounded to the nearest 1/16 in. Casing thickness was calculated. Casing bottom is as reported from the well construction and completion summary (Ledgerwood 1993) adjusted to TOC.

Borehole Notes:

Borehole coordinates, elevation, and well construction information, as shown in the above tables, are from measurements by Stoller field personnel, HWIS[3], Chamness and Merz (1993), and Ledgerwood (1993). The depths have been adjusted to TOC. Zero reference is the top of casing. A reference point survey "X" is not located on top of the casing stickup. The logging engineer measured depth to water using an e-tape.

Logging Equipment Information:

Logging System:	Gamma 2B		**Type:** SGLS (35%)
Calibration Date:	09/2002	**Calibration Reference:**	GJO-2002-384-TAC
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3	4	5/Repeat
Date	12/11/02	12/12/02	12/13/02	12/16/02	12/16/02
Logging Engineer	Spatz	Spatz	Spatz	Spatz	Spatz
Start Depth (ft)	68.0	175.0	217.0	310.0	215.0
Finish Depth (ft)	2.0	67.0	174.0	216.0	184.0
Count Time (sec)	100	100	100	100	100
Live/Real	R	R	R	R	R
Shield (Y/N)	N	N	N	N	N
MSA Interval (ft)	1.0	1.0	1.0	1.0	1.0
ft/min	N/A[4]	N/A	N/A	N/A	N/A
Pre-Verification	BB160CAB	BB161CAB	BB162CAB	BB163CAB	BB163CAB
Start File	BB160000	BB161000	BB162000	BB163000	BB163095
Finish File	BB160066	BB161108	BB162043	BB163094	BB163126

Log Run	1	2	3	4	5/Repeat
Post-Verification	BB160CAA	BB161CAA	BB163CAA	BB163CAA	BB163CAA
Depth Return Error (in.)	0	0	0	N/A	0
Comments	No fine-gain adjustment.	No fine-gain adjustment.	No fine-gain adjustment.	No fine-gain adjustment.	No fine-gain adjustment .

Logging Operation Notes:

Zero reference was top of the casing. Logging was performed with a centralizer installed on the sonde. Pre- and post-survey verification measurements for the SGLS employed the Amersham KUT (^{40}K, ^{238}U, and ^{232}Th) verifier with serial number 082.

Analysis Notes:

Analyst:	Sobczyk	Date:	2/24/03	Reference:	GJO-HGLP 1.6.3, Rev. 0

SGLS pre-run and post-run verification spectra were collected at the beginning and end of each day. The verification spectra collected by Gamma 2B were all above the control limit for the 609-keV full-width at half-maximum value and 1461-keV full-width at half-maximum value. In addition, verification file BB160CAB was above the control limit for the 2615-keV full-width at half-maximum value. The peak counts per second (cps) at the 609-keV, 1461-keV, and 2615-keV photopeaks on the post-run verification spectra as compared to the pre-run verification spectra for each day were between 3 and 10 percent lower at the end of each day. Examinations of spectra indicate that the detector functioned normally during all of the logging runs, and the spectra are accepted.

Log spectra for the SGLS were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Post-run verification spectra were used to determine the energy and resolution calibration for processing the data using APTEC SUPERVISOR. Concentrations were calculated in EXCEL (source file: G2Bfeb03.xls), using parameters determined from analysis of recent calibration data. Zero reference is the top of the casing. On the basis of Ledgerwood (1993) and the total gamma response, the casing configuration was assumed to be one string of 8-in. surface casing to a log depth of 298 ft and open-hole below 298 ft. The casing correction factor was calculated assuming a total casing thickness of 5/16 in. and applied from the ground surface to 298 ft. This casing thickness of 5/16 in. was measured by the logging engineer. A water correction was applied to the SGLS data below 270.45 ft. Dead time corrections were not needed because dead time did not exceed 10.5 percent.

Log Plot Notes:

Separate log plots are provided for gross gamma and dead time, naturally occurring radionuclides (^{40}K, ^{238}U, and ^{232}Th), and man-made radionuclides. Plots of the repeat logs versus the original logs are included. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, or casing correction. These errors are discussed in the calibration report. A combination plot is also included to facilitate correlation. The ^{214}Bi peak at 1764 keV was used to determine the naturally occurring ^{238}U concentrations on the combination plot rather than the ^{214}Bi peak at 609 keV because it exhibited slightly higher net counts per second.

Results and Interpretations:

^{137}Cs and ^{60}Co were the man-made radionuclides detected in this borehole. ^{137}Cs was detected at 121 and 143 ft with concentrations near the MDL (0.3 pCi/g). ^{60}Co (based on the 1333-keV photopeak) was

detected at log depths of 290, 291, and 297 ft with concentrations between 0.2 and 0.3 pCi/g. ^{60}Co was detected below the groundwater depth of 270.45 ft.

Recognizable changes in the KUT logs occurred in this borehole. Changes of about 5 pCi/g in ^{40}K concentrations occur at approximately 35, 220, and 299 ft. The increase in ^{40}K concentrations at 35 ft corresponds with the transition from the coarse-grained sediments of the Hanford H1 to the finer grained sediments of the Hanford H2. At 175 ft, the change in apparent ^{40}K concentrations may be due to the difference in tool sensitivity at the beginning of log run two versus the end of log run three. The decrease in ^{40}K concentrations at 299 ft corresponds with the top of the basalt (Ledgerwood 1993).

The plots of the repeat logs demonstrate reasonable repeatability of the SGLS data for the natural radionuclides (609, 1461, 1764, and 2614 keV). The ^{40}K concentrations based on the 1461-keV photopeak do not repeat at 185 and 211 ft.

The gross gamma log from Additon et al. (1978) (attached) indicates only background amounts of gamma-emitting contamination above 290 ft (88 m). The log from 5/17/63 may have detected gamma activity above background at 292 ft (89 m) and at total depth (95 m). The SGLS detected ^{60}Co at 290, 291, and 297 ft.

References:

Additon, M.K., K.R. Fecht, T.L. Jones, and G.V. Last, 1978. *Scintillation Probe Profiles From 200 East Area Crib Monitoring Well*s, RHO-LD-28, Rockwell Hanford Operations, Richland, Washington.

Chamness, M.A., and J.K. Merz, 1993. *Hanford Wells*, PNL-8800, UC-903, Pacific Northwest Laboratory, Richland, Washington.

Ledgerwood, R.K., 1993. *Summaries of Well Construction Data and Field Observations for Existing 200-East Resource Protection Wells*, WHC-SD-ER-TI-007, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

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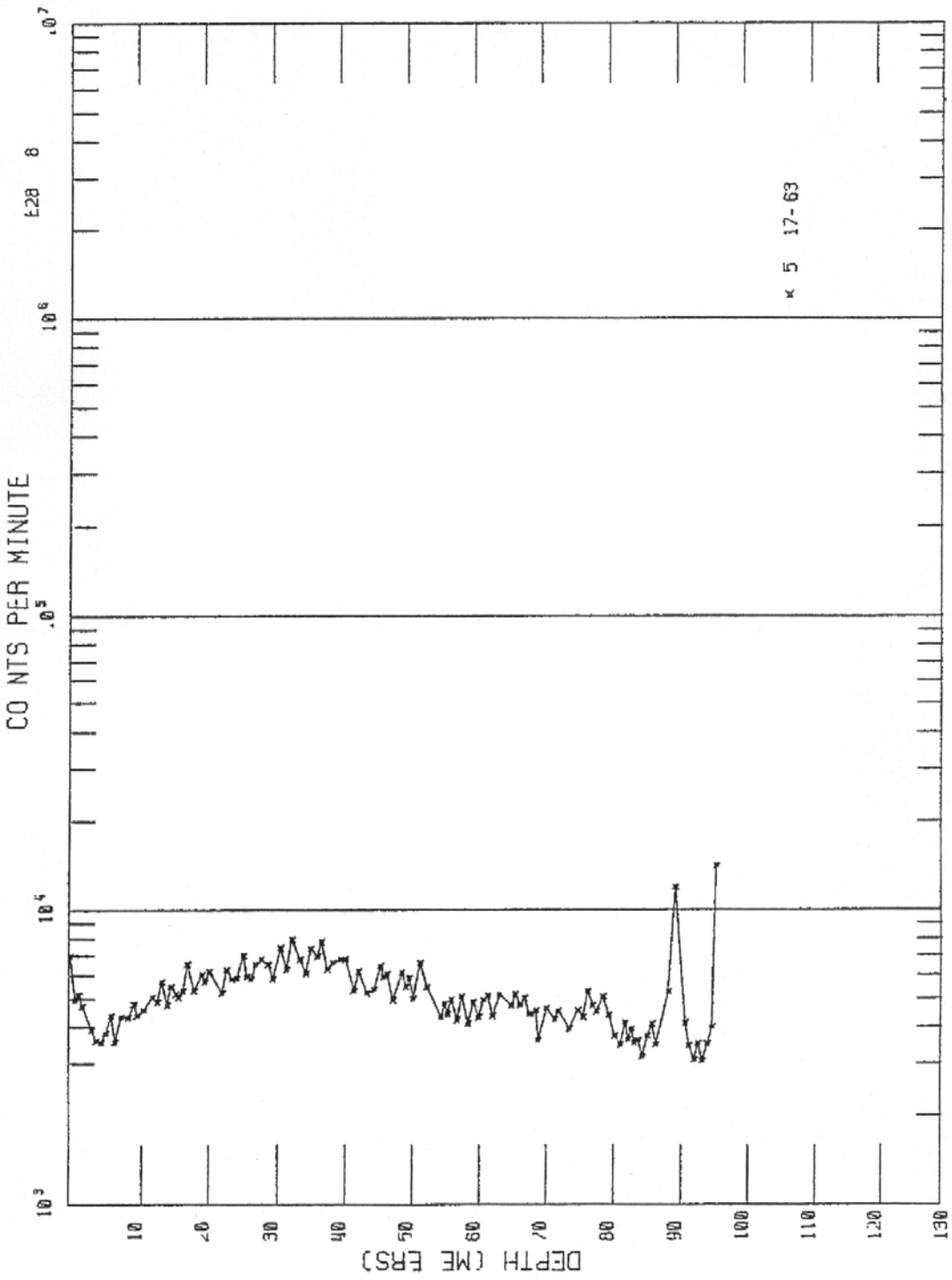
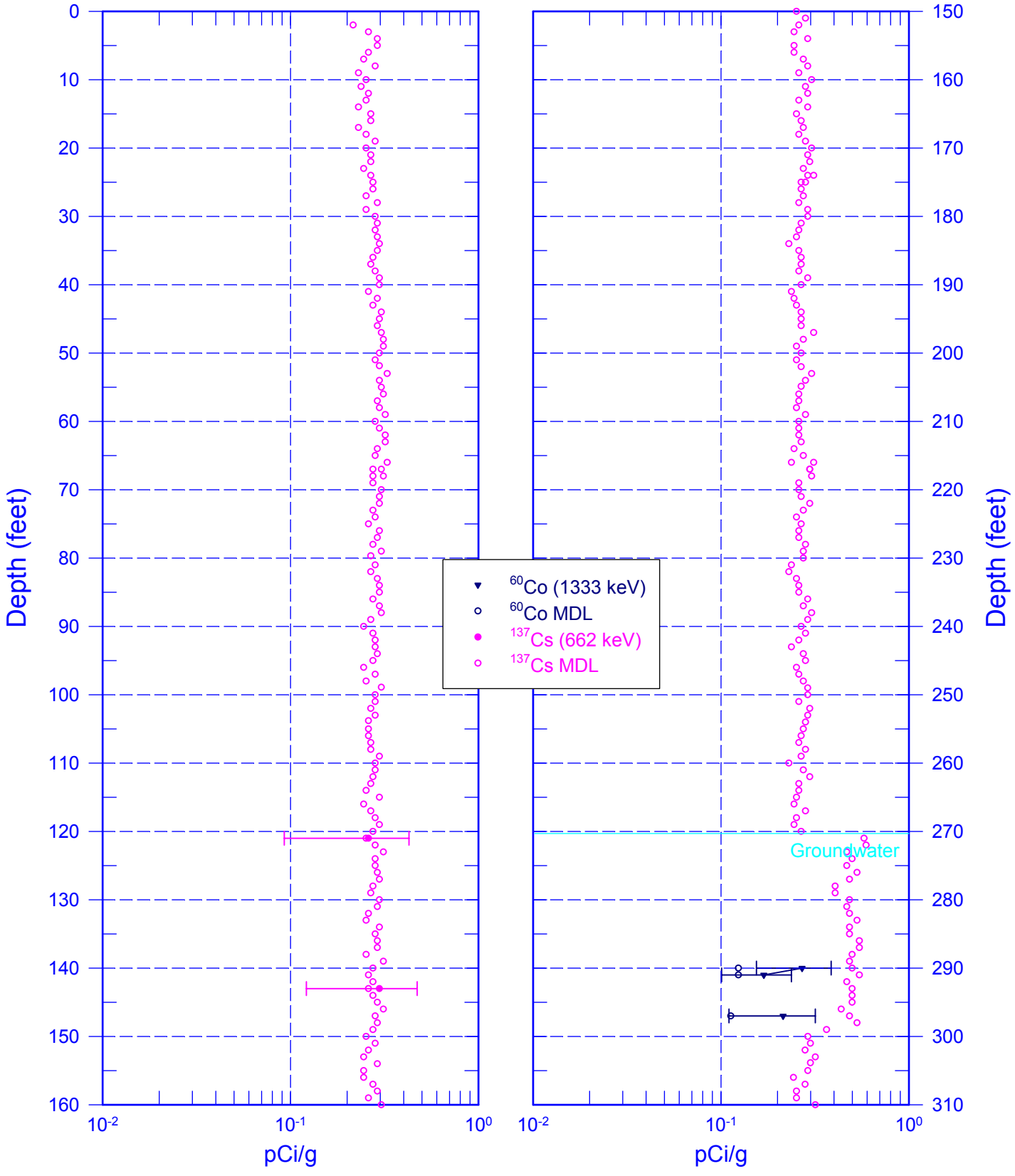
[1] GWL – groundwater level
[2] TOC – top of casing
[3] HWIS – Hanford Well Information System
[4] N/A – not applicable



from Additon et al. (1978)

Scintillation Probe Profile for Borehole 299-E28-8, Logged on 5/17/63

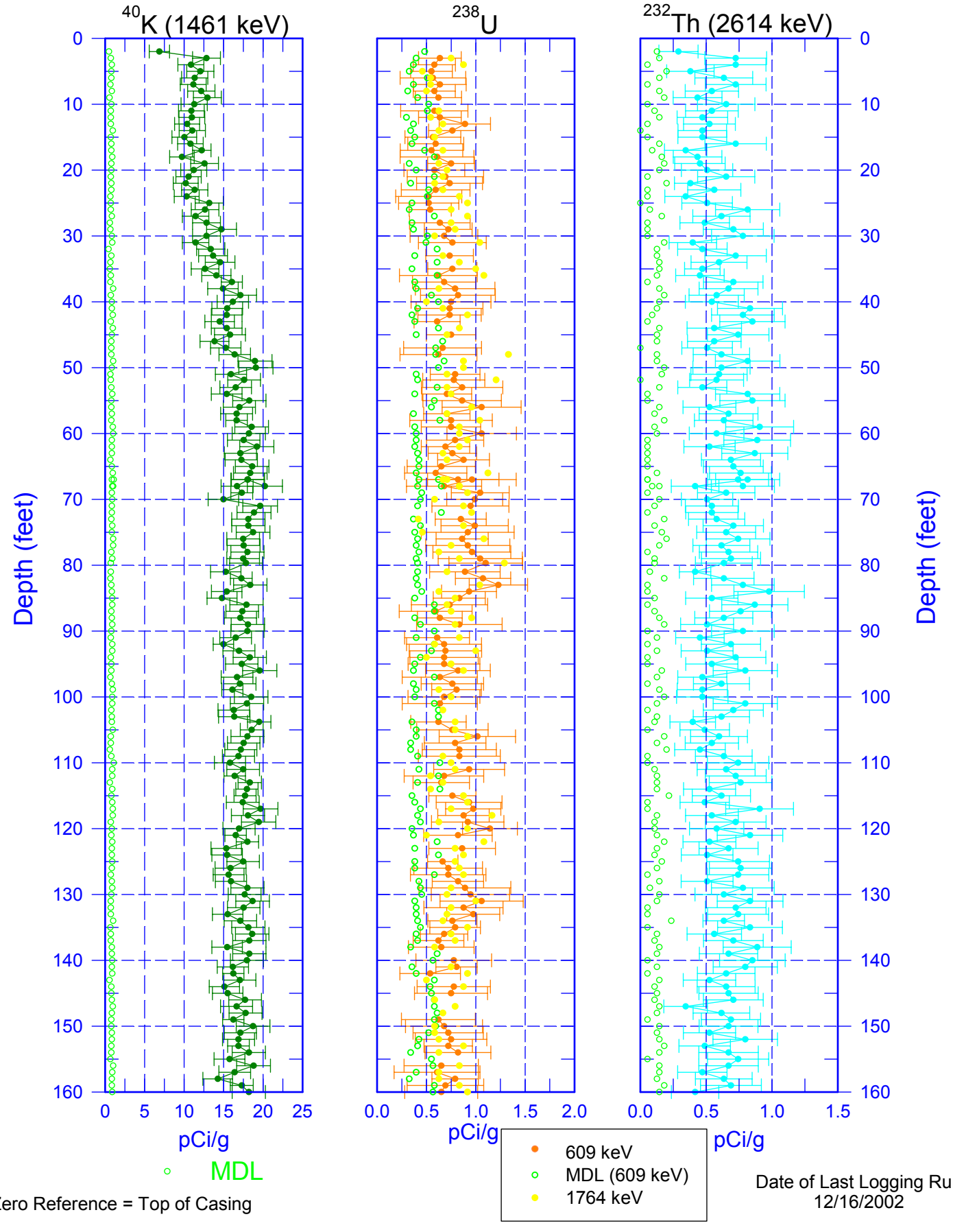
299-E28-8 (A6788)
Man-Made Radionuclides



Zero Reference = Top of Casing

Date of Last Logging Run
12/16/2002

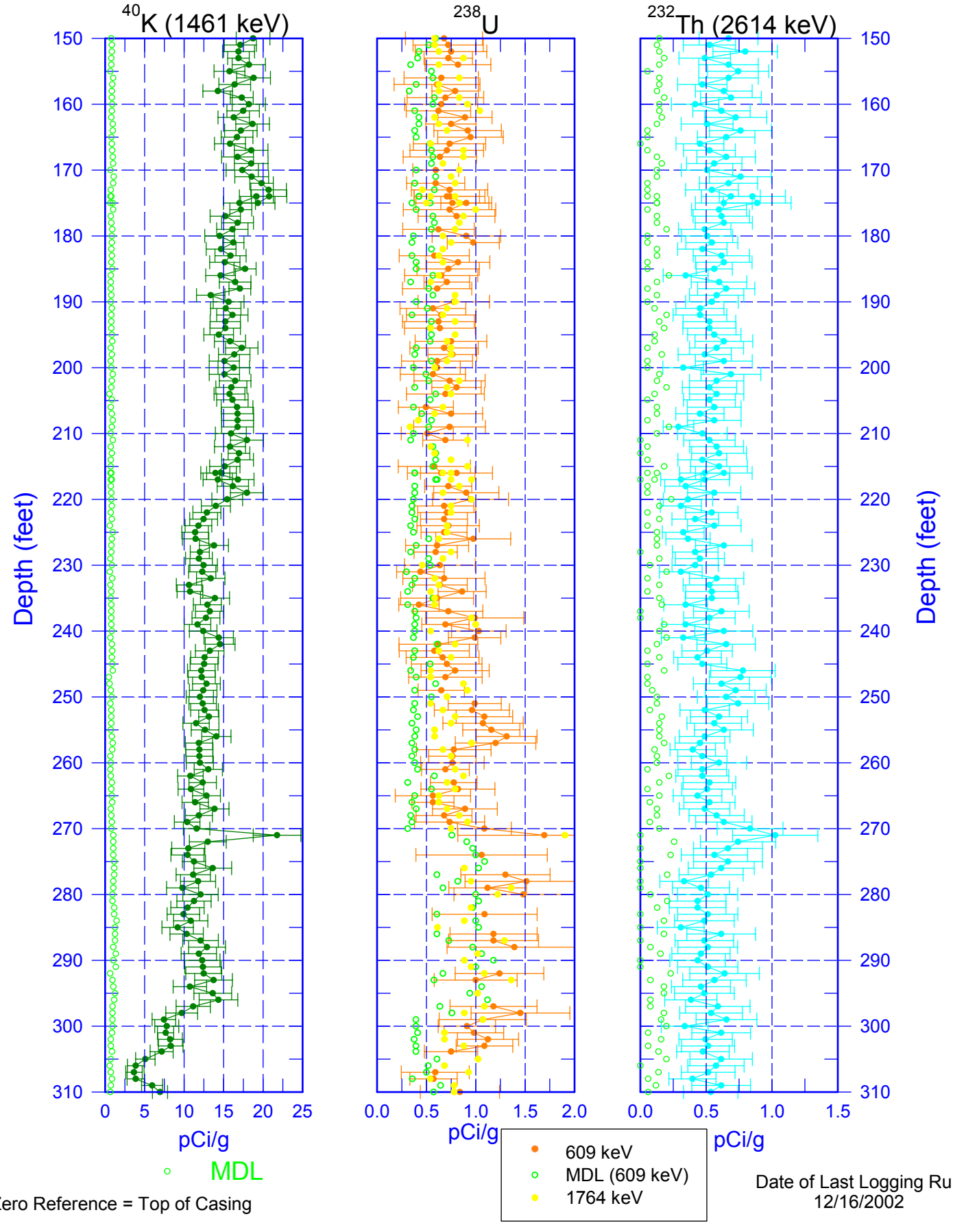
299-E28-8 (A6788)
Natural Gamma Logs



Zero Reference = Top of Casing

Date of Last Logging Run
12/16/2002

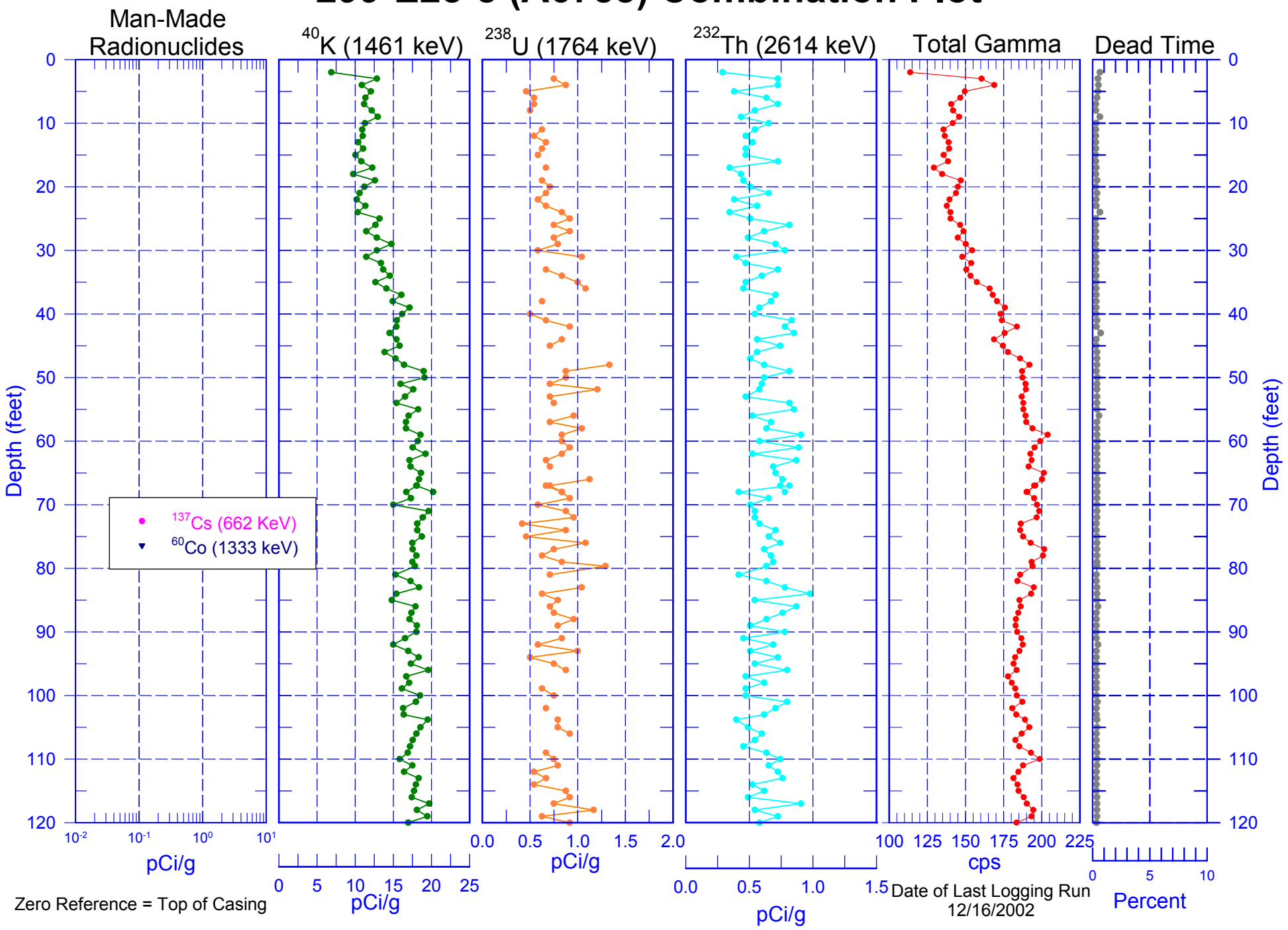
299-E28-8 (A6788)
Natural Gamma Logs



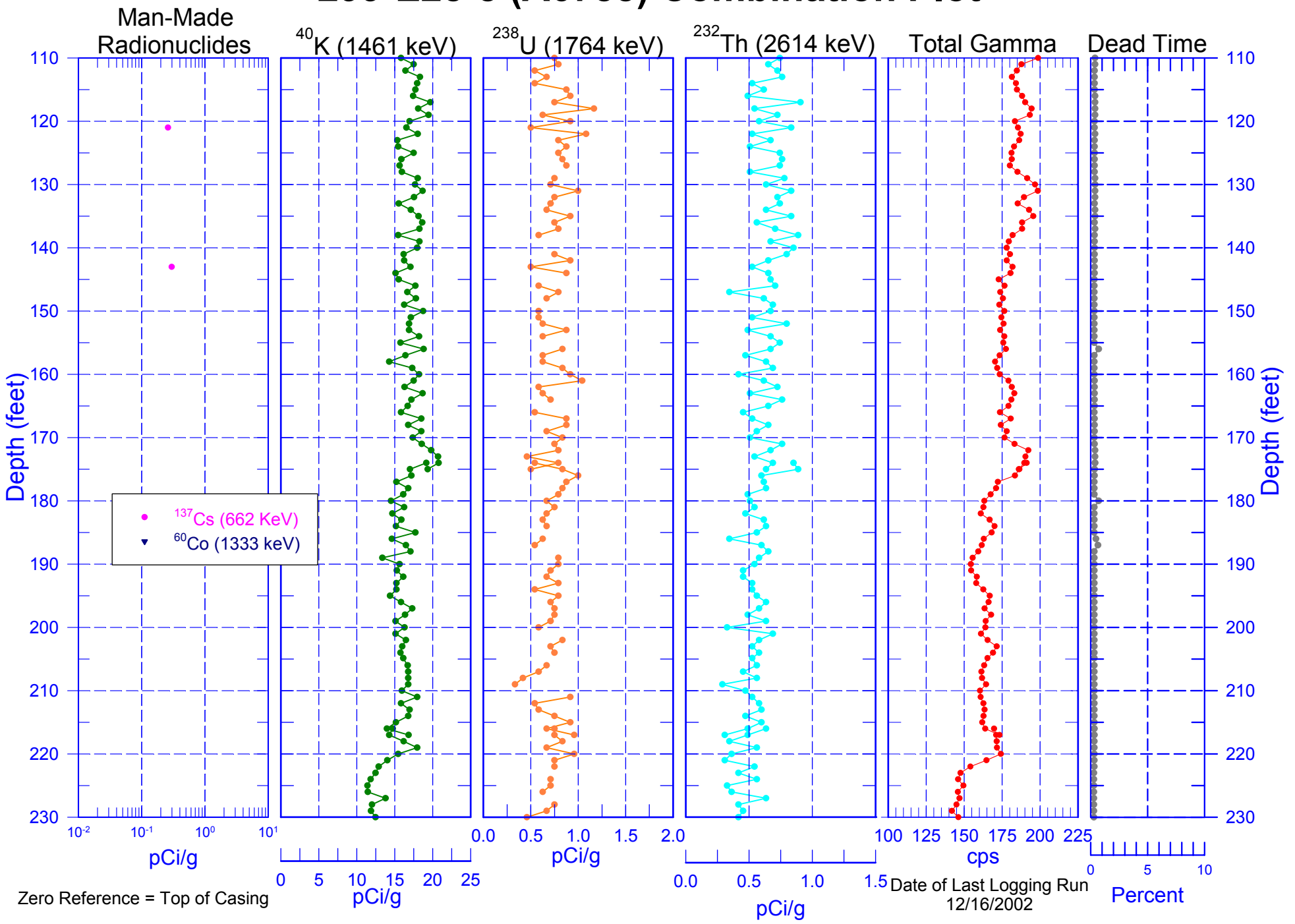
Zero Reference = Top of Casing

Date of Last Logging Run
12/16/2002

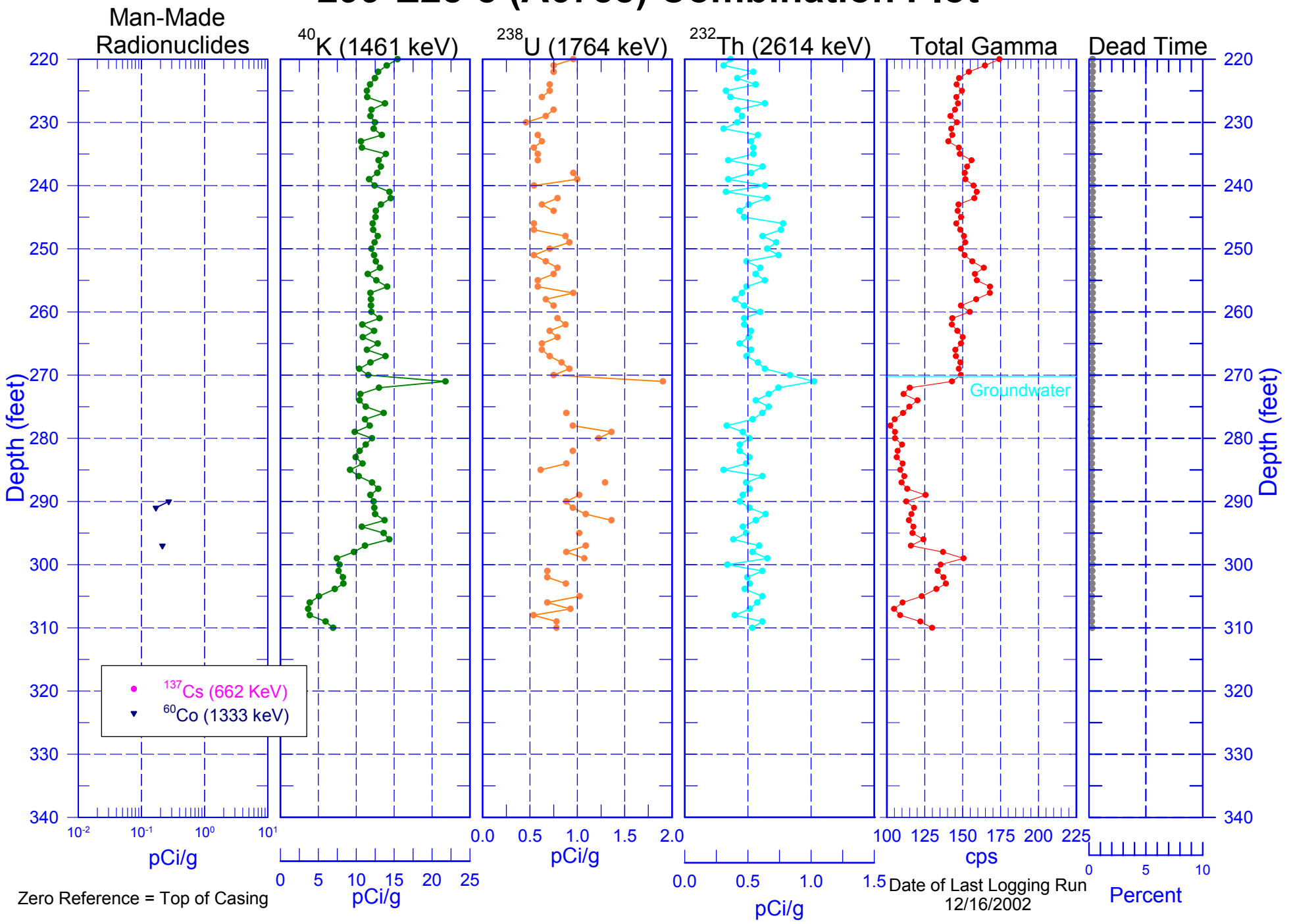
299-E28-8 (A6788) Combination Plot



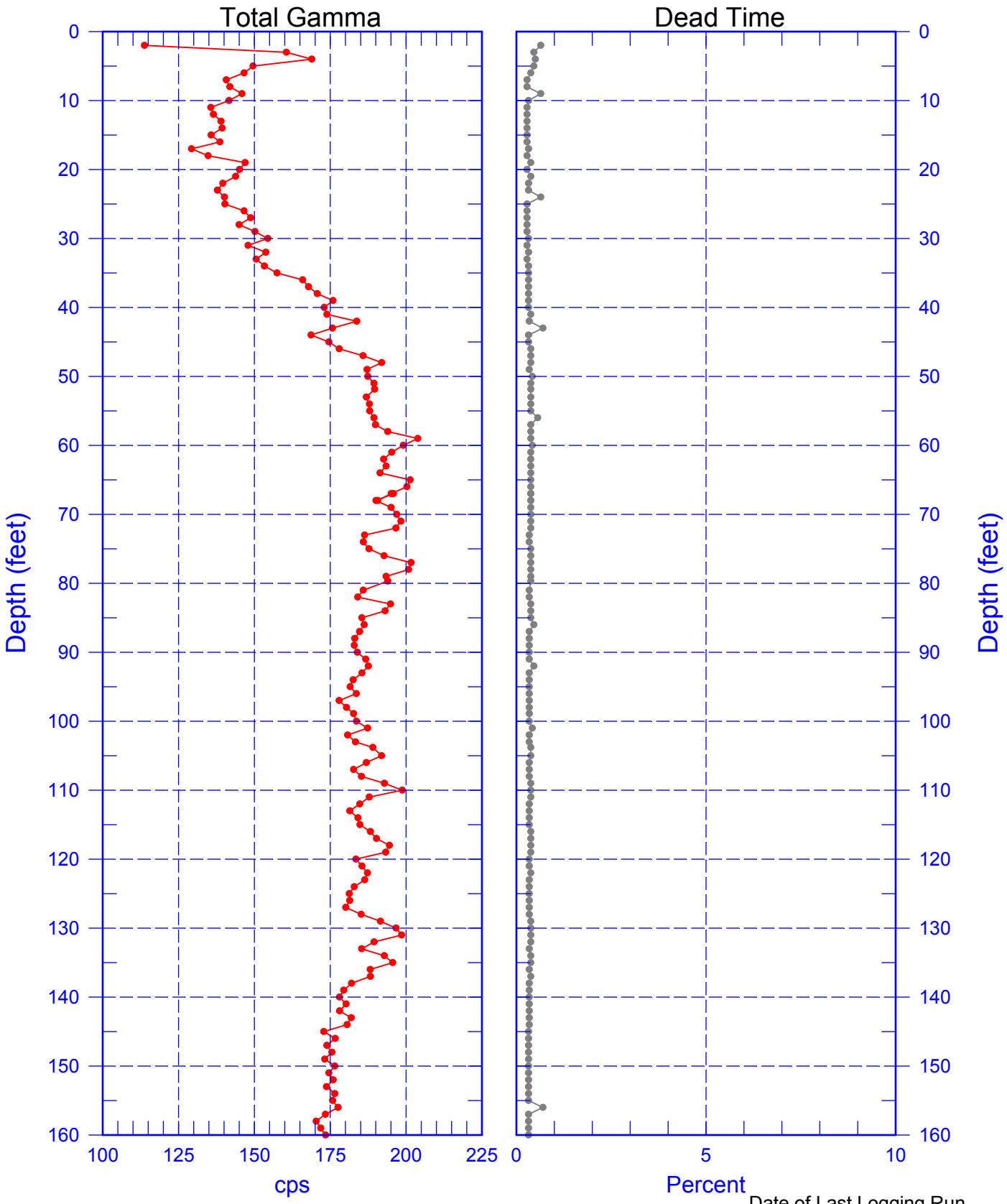
299-E28-8 (A6788) Combination Plot



299-E28-8 (A6788) Combination Plot



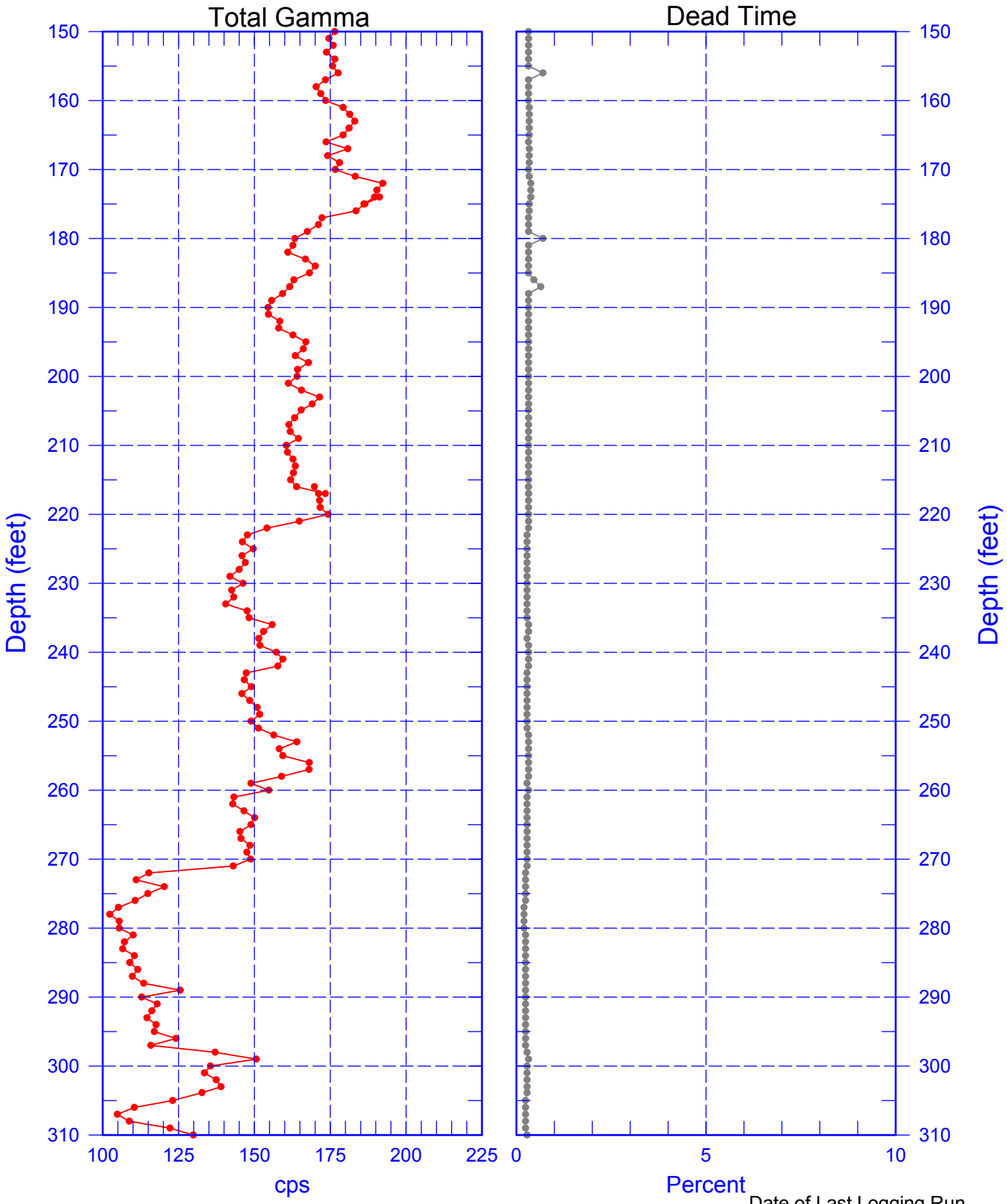
299-E28-8 (A6788)
Total Gamma & Dead Time



Zero Reference = Top of Casing

Date of Last Logging Run
12/16/2002

299-E28-8 (A6788)
Total Gamma & Dead Time



Zero Reference = Top of Casing

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299-E28-8 (A6788)

Rerun of Natural Gamma Logs (215.0 to 184.0 ft)